US006813218B1

(12) **United States Patent**
Antonelli et al.

(10) **Patent No.: US 6,813,218 B1**
(45) **Date of Patent: Nov. 2, 2004**

(54) **BUOYANT DEVICE FOR BI-DIRECTIONAL ACOUSTO-OPTIC SIGNAL TRANSFER ACROSS THE AIR-WATER INTERFACE**

(75) Inventors: **Lynn T. Antonelli**, Cranston, RI (US); **Fletcher Blackmon**, Forestdale, MA (US)

(73) Assignee: **The United States of America as represented by the Secretary of the Navy**, Washington, DC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/679,680**

(22) Filed: **Oct. 6, 2003**

(51) **Int. Cl.**[7] **H04B 1/59**
(52) **U.S. Cl.** **367/3**; 367/134
(58) **Field of Search** 367/3, 134

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,060,206 A * 10/1991 DeMetz, Sr. 367/3
6,058,071 A * 5/2000 Woodall et al. 367/3

* cited by examiner

Primary Examiner—Daniel Pihulic
(74) *Attorney, Agent, or Firm*—James M. Kasischke; Michael F. Oglo; Jean-Paul A. Nasser

(57) **ABSTRACT**

A buoy system bi-directionally communicates in-air and underwater. A buoy having a shell to float on water has an upper portion in air and a lower portion in water. An array of acoustic transducers which is disposed in the lower portion receives acoustic signals and transmits acoustic signals. A dome-shaped retro-reflective coating on the upper portion is vibrated for retro-reflecting impinging laser illumination as data signals in air. An array of photo-detectors on the upper portion are responsive to impinging laser control signals and/or signals which may be transmitted as acoustic signals in water.

12 Claims, 1 Drawing Sheet